PTA-TTSM-2025-A186091

EDUCATIONAL FARMING GAME SYSTEM: “MY FARM”

YAN XUEQING , MOHD JUZAIDDIN AB AZIZ

Fakulti Teknologi & Sains Maklumat, Universiti Kebangsaan Malaysia

ABSTRACT

Farming simulation games like QQ Farm and Stardew Valley usually focus on entertainment and profit. However, most games lack educational content related to real-life farming practices. This project developed an educational game system called "My Farm" that aims to combine entertainment and learning in an interactive way. It introduces plants in the form of pop-ups to enhance players' understanding of sustainable agriculture and crop cycles. The system introduces real farming techniques such as watering, selecting seeds, and plant growth cycles and harvesting.

1. Introduction

My Farm is a simulation game designed to introduce players to basic and advanced concepts of real-world agriculture. Unlike traditional agricultural games that focus purely on entertainment or economic development, My Farm combines educational and practical elements to provide a comprehensive learning experience. Through intuitive gameplay, players can complete basic farming tasks such as planting, watering, fertilizing, harvesting and selling crops.

The game goes beyond simple game mechanics to incorporate scientific elements such as crop growth cycles. Players face real-time challenges that mirror those faced by real-world farmers, such as unpredictable weather patterns, limited financial resources, and the need to balance environmental and economic goals.

To enhance learning, My Farm provides educational prompts in the form of pop-ups, in-game prompts, and scenario-based feedback. This combination of knowledge and gameplay helps players understand the long-term impact of their decisions.

In addition, My Farm aims to raise awareness of global issues such as climate change, food security, and sustainable development. It encourages critical thinking and responsible decision-making and is suitable for students, casual gamers, and anyone interested in agriculture. The game design also focuses on ease of use, ensuring that both beginners and advanced players can learn and enjoy the gaming experience.

In short, My Farm is more than just a game - it is an educational platform presented in a fun and engaging format that aims to bridge the gap between technology, education, and agriculture.

2. Problem Statement

While farming simulation games are popular for their relaxing gameplay and resource management mechanics, many existing games still fall short in providing meaningful educational experiences. These games often prioritize entertainment, in-game currency systems, or social features, while ignoring the real science behind farming.

First, most games lack scientific accuracy and in-depth knowledge of crop growth cycles, plant biology, or seasonal dependencies. Crop growth in these games follows simple timers and is not affected by real farming conditions such as soil health, temperature, rainfall, or sunshine.

Second, few games leverage real-time data or predictive analytics to simulate real farming scenarios. For example, using real-world weather data to determine crop yields, or integrating cost-benefit analysis tools to teach budgeting and investment strategies in farming.

Third, these games offer little guidance for decision making. Players can earn coins and expand their farms, but rarely learn about the reasons behind resource allocation, environmental impact, or sustainable land use.

Finally, the learning curve for sustainable farming practices is often steep, and most games lack user-friendly educational elements such as tooltips, tutorials, or real-time feedback systems. Without proper guidance, players miss out on opportunities to learn about agricultural sustainability, which is increasingly important in today's world.

My Farm addresses these issues by combining real-world farming concepts, AI-driven personalization, and predictive learning systems into a simplified and engaging farming game environment.

3. Project Objectives

The main goal of the My Farm project is to bridge the gap between agricultural education and interactive games. The project aims to create a digital environment where players can not only enjoy managing their own farms, but also learn important agricultural concepts through simulation.

The specific objectives of the project are:

Develop a realistic agricultural simulation game that incorporates real agricultural practices, including crop rotation, fertilization, weather dependence, and sustainability principles.

Provide an intuitive and interactive interface that makes it easy for users (regardless of

age or prior knowledge) to participate in agricultural activities and understand the science behind them.

Evaluate players' understanding through performance indicators such as crop yield, resource efficiency, and completion of educational challenges. In-game feedback and achievement systems will help evaluate and reinforce learning outcomes.

Integrate data-driven decision-making tools to allow players to experience the consequences of their choices, such as overfertilizing, planting in the wrong season, or ignoring weather conditions.

Raise awareness of food security and climate challenges by exposing players to real-world issues in a simulated environment, encouraging them to think critically and take sustainable actions.

4. Methodology

The My Farm project uses an incremental development model, which is well suited for the development of educational games. This approach allows for gradual implementation, continuous improvement, and timely integration of feedback.

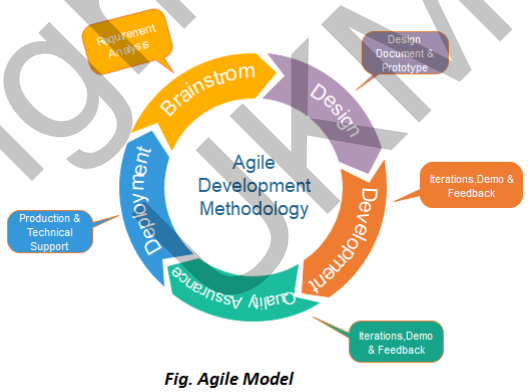

Figure 4.1 Agile methodology used in developing the Farm Game

4.1 Planning Phase

Analyze project requirements and outline core features. These features include crop selection, weather simulation, and educational prompts. A development schedule is created using a Gantt chart to ensure progress tracking.

4.2 Design Phase

During this phase, the team designs the UI/UX of the system and defines the technical architecture using the Model-View-Controller (MVC) pattern. In addition, wireframes for crop layouts, game menus, and educational interactions are drawn.

4.3 Development Phase

The development team uses Unity3D and C# to build modules such as crop growth mechanisms, weather engines, income tracking, and educational feedback systems. Each module is implemented and tested independently.

4.4 Implementation and Testing Phase

The game will undergo Alpha and Beta testing. Testers provide feedback on usability, educational clarity, and game balance. Bugs are fixed and the UI is optimized for responsiveness and ease of use.

4.5 Evaluation Phase

Conduct a formal evaluation to measure the educational impact of the game. Key metrics include user engagement, retention of learning outcomes, system stability, and the ability to realistically simulate farming.

5. Project Outcomes

5.1 User Needs Analysis

The game system was designed with the user in mind to ensure ease of use, engagement, and educational effectiveness. User needs were collected through informal interviews, observations, and testing sessions, targeting students and casual gamers interested in agriculture or sustainability. The analysis identified the following core user needs:

Interactive Farming Mechanics: Users should be able to freely select seeds, plant, water, and harvest. These core mechanics simulate real agricultural workflows in an intuitive way.

Educational Integration: Informative tooltips and educational pop-ups are triggered based on player actions. These elements provide scientific knowledge about plant species, growing conditions, and sustainable practices, turning the game process into a learning experience.

Strategic Resource Management: Users must manage limited resources, such as water, fertilizer, and money. This encourages farmers to plan, think critically, and recognize the challenges they face in real life.

Progression and Incentives: The system incorporates gamified progression through levels, achievements, and virtual currency to keep users engaged and incentivize them to continue learning.

5.2 Key Features of the Game System

The final version of My Farm includes the following key features to support its educational and gaming goals:

Figure 5.1 Game System interface

Interactive tutorial: First-time users will learn basic game mechanics and objectives through an engaging step-by-step guide.

Crop system: Players can choose crops according to the in-game season, plant them on designated plots, water and fertilize them, and finally harvest and profit.

Scientific crop information: Each crop is accompanied by a detailed description, such as optimal growing conditions, fertilizer compatibility, and economic value.

Dynamic weather simulation: The system randomly generates sunny or rainy days, affecting crop growth and player strategies.

Prediction analysis engine: The game uses internal logic to predict crop yields based on player input (such as watering frequency, fertilization, and weather conditions).

Achievement and feedback systems: Provide rewards based on performance (e.g., crop success, income) and provide feedback on player decisions to reinforce learning.

5.3 Technology Stack

Front-end Development:

Engine: Unity3D (2D game interface and mechanics)

Design Tools: Canva and GIMP (for UI and asset creation)

Back-end Development:

Database: Firebase Realtime Database (for storing user data, progress, and game state)

Programming Language: C# (for game logic and user interaction)

These tools were chosen for their accessibility, performance, scalability, and support for real-time interactivity that is critical for simulation-based learning environments.

Figure 5.1 Game interface

6. Conclusion

The My Farm project successfully blends entertainment and education in a gamified environment. It not only provides players with an enjoyable agricultural simulation experience, but also teaches them the basic principles of agriculture, including crop cycles, climate patterns, soil health, resource management, and sustainability.

By leveraging interactive mechanisms, real-time feedback, and educational content, the game effectively raises awareness of food security, environmental management, and key agricultural decisions. Players learn by doing—trying out various strategies and gaining insights into their effectiveness.

The project highlights the potential of serious games in education, especially in fields such as agriculture that traditionally require hands-on experience. My Farm builds a digital bridge between knowledge and practice, making agricultural education accessible, engaging, and impactful to a wide audience.

7.REFERENCE

Makeham, J. P., & Malcolm, L. R. (1993). The farming game now. Cambridge University Press.

Chang, A. Y. (2012). Back to the virtual farm: Gleaning the agriculture-management game. Interdisciplinary studies in literature and environment, 19(2), 237-252.

Makeham, J. P., & Malcolm, L. R. (1981). The farming game (p. 559pp).

Longworth, J. W. (1970). FROM WAR‐CHESS TO FARM MANAGEMENT GAMES. Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, 18(2), 1-11.

Marco, J., Cerezo, E., & Baldassarri, S. (2013). Bringing tabletop technology to all: evaluating a tangible farm game with kindergarten and special needs children. Personal and ubiquitous computing, 17, 1577-1591.

Yeong-Seong, M., & Hyo-Taek, L. (2023). Smart Farm Metabus game for Settlement Process of Returning Farmers. The Journal of The Institute of Internet, Broadcasting and Communication, 23(1), 93-100.

Hawkins, R. D., Ferreira, G. A. M., & Williams, J. M. (2019). The development and evaluation of ‘Farm Animal Welfare’: an educational computer game for children. Animals, 9(3), 91.

Jung, M. A., & Jung, H. W. (2020). Analysis of educational elements of educational online games-focused on real farm games. Journal of Korea Entertainment Industry Association, 14(3), 173-180.